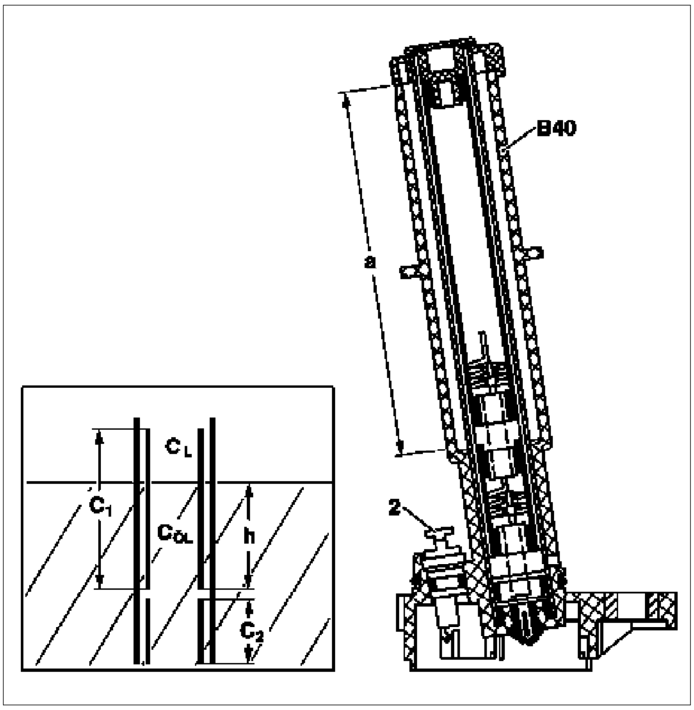
B40 Oil sensor (oil level, temperature and quality)
2 Temperature sensor (PT1000)
A Capacitive measuring range

C1 Top condenser
CL Capacitive air
COIL Capacitive engine oil

C2 Bottom condenser
h Fill level



P18.40-2046-12

Oil level and oil quality are detected on the basis of the capacitance of the engine oil (dielectric). The oil temperature is detected by the temperature sensor. All the signals are processed in the electronics to form a PWM signal and transferred to the engine control unit.

The measuring principle of the oil sensor is a capacitance measurement, whereby the capacitance is dependent upon the oil level. The measuring system consists of two cylinder condensers which possess a metal pipe as a common external electrode. Both other electrodes are arranged over each other as an inner pipe.
The dielectric constant of the engine oil is determined by the lower condenser (C2) which is always full of oil (e approximately 2.3 to 4.0).

The fill level (h) is then determined by the upper condenser (C1) using the dielectric constant. The capacitance of the upper condenser (C1) is calculated on the basis of a parallel connection with two condensers which have air and engine oil as a dielectric material.

The condensers are located in a plastic housing which serves as a damping cup. The engine oil flows through the feed bore holes into the housing between the condensers.

The measuring range for the oil level is 80 mm
(normal level F 40 mm), accuracy of measurement approx.
F 3 mm.
The voltage for the oil sensor (approx. 5 V) is supplied by the engine control unit.

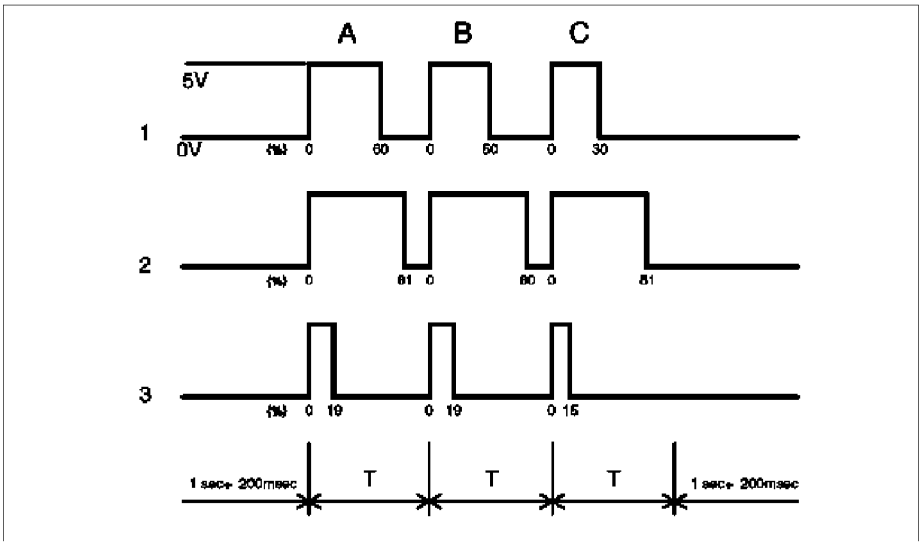
Signal assignment oil sensor

1 On/off ratio signals Okay
A Oil temperature 20 to 80%
B Oil level 20 to 80%
C Oil quality 20 to 80%

2 On/off ratio signals >80 %
A Oil temperature > +160 °C
B Oil level >80 mm
C Oil quality e>*6*

3 On/off ratio signals <20 %
A Oil temperature < - 40 °C
B Oil level <0 mm
C Oil quality e< *1*

T pulse duty factor 100 %



P07.61-0445-05

Each information block consists of three successive square-wave signals, This is followed by a short pause.
A measured variable is assigned to each square-wave signal (A, B, C). The quantisizing in each case is based on the on/off ratio (T) of approx. 20 to 80 %.

Because oil level and oil quality (capacitance of the engine oil) are dependent of each other, this information is first compensated for in the engine control unit, before it is transmitted via CAN databus to instrument cluster.

i

The following faults at the oil sensor are detected by the engine control unit and entered in the fault memory:
- Duty cycle of a signal less than 17 % or more than 83 %
- Dielectric constant of engine oil longer than 100 seconds greater than 5.8 (e.g. because of a lot of water in the engine oil).